Comparison of Quality Infrastructure of the Republic of South Africa and Sweden

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Abstract — The study focuses on Comparative Study of Quality Infrastructure (QI) between Republic of South Africa (RSA) and Sweden. QI is important for the reason that it provides technical support to companies in order to improve their production processes and ensuring compliance to regulations or international requirements. QI in this study refers to six foremost institutions, which are accreditation body, inspection body, testing laboratory, certification body, metrology institution and standardization body. The methodology employed was by data collections through questionnaires and interviews. The result of the study found that the QI of both South Africa and Sweden is the same based on the types of institutions. It was also observed that the employees of both countries are offered long services of minimum of seven years. A significant difference of 22.6% was reported between the two countries with respect to agreement that law mandates compliance with standard. It was further observed that the QI of both South Africa and Sweden plays a role in reducing non-compliance and adding value to the economies of these countries.

Index Terms–Accreditation, Certification, Quality Infrastructure, Standardization.

I. Introduction

QI is defined as the totality of the institutional framework, whether public or private, the output of which includes the process of formulating, issuing and implementing standards and the associated evidence of compliance (the relevant mix of inspection, testing, certification, metrology and accreditation), to improve the suitability of products, processes and services for their intended purposes, prevent barriers to trade and facilitate technological cooperation [1]. QI came into existence because of the globalization of the international economy and increased consumer awareness [2]. QI refers to all aspects of accreditation, certification, inspection, metrology, standardization and testing. Before products can be put on the market, they need to be designed or produced according to a specific standard developed by a standardization body. The products need to be tested by an accredited testing laboratory to check if they meet the requirements of the relevant standard.

The products are tested using equipment that is calibrated by metrology institutions. Some products carry the certification mark issued by the relevant certification body as a proof of compliance. The products are inspected in the factory by an inspection body as well as in the market to assess compliance. All the institutions that fall under QI need to be accredited to a specific standard by an accreditation body to prove their competence to perform their task or function. The national accreditation body needs to be affiliated with the International Accreditation Forum (IAF) and/or the International Laboratory Accreditation Cooperation (ILAC) in order to be recognised globally.

The products that go through QI processes are in principle of good quality since they are designed or manufactured in accordance with the relevant standard(s) or technical regulation(s) and go through an assessment of QI processes before they can reach consumers.

II. Motivation/Problem statement

There are a lot of non-compliant products that are imported into the RSA. These products pollute the economy and cause extensive and long-term harm to consumers and the environment. Therefore this study sets out Analyse whether QI in the RSA and Sweden play a role in eliminating non-compliance in the two countries' markets and to establish if QI has an impact in the economy of both countries.

By looking into a research problem statement, the following research objectives are being considered for this study:

- To determine if QI of the RSA and Sweden can reduce non-compliance in the markets of both countries.
- To determine if QI of the RSA and Sweden add value to the economy of both countries.
- To determine if there are differences in the QI of the RSA and Sweden.

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III. Literature review

QI is defined as aspects of accreditation; certification, metrology, quality management, standardisation and testing that have a bearing on conformity assessment [2].

A. Metrology

Metrology is the science that provides us with the accuracy; we need to get on with business and our personal lives [3]. Metrology covers all aspects of theoretical and practical that reference to measurement, this includes their uncertainty, and in whatever fields of science or technology they occur [4].

Measurement is an indispensable part of our lives, for example, the bread we buy must weigh certain grams, the clothes we buy must be of a certain size, and the petrol we buy must be of certain litres. Therefore metrology plays a role in most of the things we use in our daily basis.

B. Standardization

Standardization is defined as an activity that people develop bases or rules for measuring things and thus codes of conducts by establishing regularity from the disorder [5].

The using of standards adds a significant financial benefit to countries as they encourage the application of new technology, which helps to speed up the processes of getting the results quicker. New technology helps to reduce the turnaround times for producing and testing products.

The World Trade Organisation has played a role in encouraging countries to harmonize their national standards with international standards. This helps the countries to compete globally since other countries can accept their products without adjusting or amending them. Harmonisation therefore implies one product one standard.

C. Testing

Testing is defined as determination of one or more characteristics of an object of conformity assessment, according to a procedure or standard [6]. The testing laboratory can operate with or without accreditation. However the results from accredited testing laboratories are recognized globally. An accredited testing laboratory (ATL) is a laboratory that has been assessed by a national accreditation body and has been declared competent to carry out the tasks it performs [7].

The harmonisation of laboratory tests globally is a significant undertaking, which requires the active involvement of numerous stakeholders, for example industries, law enforcement agencies, standardization bodies, metrologies, accreditation bodies, Non-Profit Organisations (NGOs), etc. [8]. This helps when a product is being approved by one testing laboratory as the results will be accepted by other testing laboratories without further test(s).

Accredited testing laboratories play a vital role in many businesses today because before a product can be put on the market, it has to meet certain requirements specified either in a standard(s) or technical regulation(s). An ATL then takes a product and tests it according to the relevant standard or technical regulation. When the test is completed, the result will show whether or not the product complies with the requirements of standard(s) or technical regulation(s).

D. Quality Management

Quality Management System (QMS) is defined as a management system to direct and control an organisation regarding quality [9]. Quality is customer satisfaction and loyalty [10] whereas [11] stated that quality is an excellent product or service that fulfills or exceeds customer expectations. QMS incorporates quality planning, provides a framework for managing the activities that enable the company to create items and services which consistently satisfy the customer and regulatory requirements, and is a tool for achieving enhanced customer satisfaction [12].

Without organizations considering QMS and quality in their businesses it will be difficult for them to compete globally in the market they are involved. The intention of QMS and quality is to satisfy the customer according to his needs, ensuring that customer's needs or inputs are considered or incorporated when producing the product.

E. Certification

A Certification body is a body that assesses an organisation under its specifications and the requirements of ISO/IEC standards [13]. The certification bodies must comply with the following international standards: ISO/IEC 17065 *General requirements for bodies operating product certification system, ISO/IEC 17024 Conformity Assessment: General requirements for bodies operating certification of person, and ISO/IEC 17021 Conformity Assessment: Requirements for bodies providing audit and certification of management systems* [14].

The following are the reasons why most companies need certification; for contractual or regulatory requirements, need to meet customer preferences, help motivate staff by setting a clear goal for the development of its management system [15].

Other certification bodies allow companies that they certified to use their mark/logo as a proof that their products have been assessed and certified under specific standard(s) or technical regulation(s). When customers see the mark/logo of the certification body on the product they are assured of the quality of such a product because they know the product will have been approved for compliance.

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F. Accreditation

International standard organisation define accreditation is the term applied to the third party which conduct conformity assessment on conformity assessment bodies (e.g. certification, testing, inspection bodies) with the relevant standards [6]. Fitzgerald [16] Pointed out that accreditation is the process by which certification bodies, testing laboratories, inspection bodies are assessed to check the competency that these institutions can perform their task according to their scope.

The process of approving the products or services by conformity assessment bodies guarantees the consumers that whatever the manufacturer or service provider produces or provides is of the required quality. The accreditation body plays an important role in QI since it is the only body that accredits the conformity assessment bodies to prove their competence to perform their task or duties. Whatever product has been approved by the accredited conformity assessment body gives confidence to consumers that such product meets the standard(s) or technical requirements.

IV. Research Methodology

Research methodology is a way for systematically solve the research problem as identified by the researcher [17].

Data was collected by sending questionnaires to the organizations that form part of QI in the RSA and Sweden. The intention of collecting data from respondents was to get opinions and ideas to help the researcher to come up with conclusions and to provide a recommendation based on the information collected. The data collected was analysed using Microsoft Excel - bar charts.

V. Data Collection

The process of the data collection/analysis aims to identify any emerging patterns or trends that can be isolated to establish themes in the data [18]. The intention of data analysis is to come up with the conclusions regarding the population that was studied and give the recommendations thereof. Data collected will be analyzed by using grounded theory and Microsoft Excel. [19] states that grounded theory approach derive, inductively, a conceptual framework or theory through a systematic process of data comparison and subsequent theoretical sampling.

VI. Results and Discussion

The following presents some of the results in Figure 1-7.

Fig. 1. shows that the respondents from South Africa, has diploma qualification of 45.9%, whereas respondents from Sweden has diploma qualification of 8.5%.

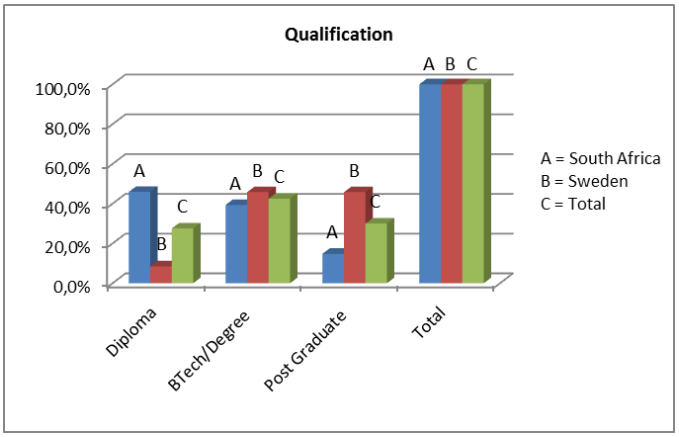

Fig. 1. Qualifications distribution

Again the respondents from South Africa with post graduate degree are 14.8% while respondents from Sweden with post graduate degree are 45.8%. This implies that the majority of respondents from Sweden are with higher postgraduate than South Africa. On the other hand, South Africa has high respondents of diploma graduate than Sweden.

Fig. 1. shows that South Africa has a majority of under-graduate whereas Sweden has majority of post-graduate. This concludes that Sweden has staffs that are highly qualified when compared to South Africa under QI. It is therefore recommended that the South African institutions should encourage their staff to further their studies after completing their under-graduate studies. This can be done by government and the institution that form part of the QI when they offer bursaries to help the staff to further their studies.

Fig. 2. shows that the respondents from South Africa reveal that 98.4% of organisations that form part of the QI are structured within the government, whereas respondents from Sweden indicate that only 30.5% of organisations form that part of the QI are structured within the government. This implies that the subject of QI in South Africa is well disseminated among public service respondent whereas QI in Sweden is both concentrated within the private institutions.

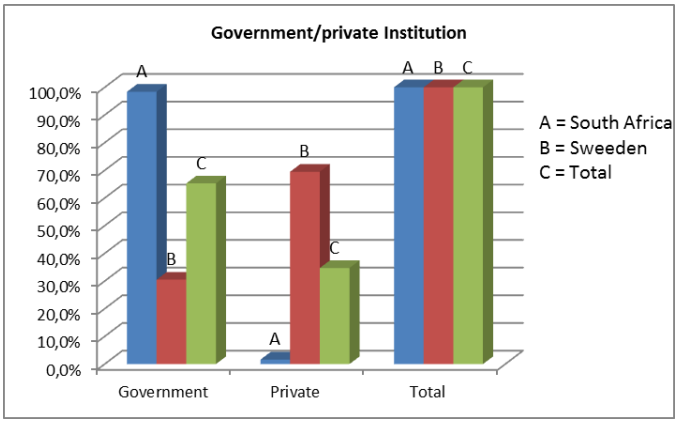

Fig. 2. Organisation demography

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It has been noted that Fig. 2. shows that South Africa institutions that form part of the QI are under government, whereas the Sweden counterparts are either in government or private. When these institutions are under one government ministry, it can be easy to influence the policies of these institutions as the incumbent minister can be biased in the decision-making when one of the institutions differs with the other institutions regarding operational issues. For example, a minister can influence the inspection body to use a testing laboratory that is under his/her ministry with the sole purpose of assisting that testing laboratory to make a profit even though that testing laboratory is not competent enough to perform some of its functions. Therefore the inspection body is compelled to use that testing laboratory even though there maybe alternative testing laboratories.

Fig. 3. shows that 98.4% of respondents from the QI of South Africa belong to organisations, which are members of an international committee, whereas 98.3% of respondents from the QI of Sweden belong to organisations which are members of an international committee. This implies that the majority of respondents from both the QI of South Africa and Sweden know that their organisations are a member of at least one international committee.

Fig 3. Organisations affiliation with international committee

Fig. 3. shows that institutions that form part of the QI are members of international committees. This confirms that the most of the institutions that form part of the QI of South Africa and Sweden are members of international committees, where most decisions relating to trade are discussed. Therefore it is recommended that all the institutions that form part of the QI of South Africa participate in these international committees to enable them to be in a position to influence the decisions that will affect the economy of the country.

Fig. 4. shows that 54.8% of respondents from the QI of South Africa agree that compliance with a standard is mandated by law, whereas 32.2% of respondents from QI of Sweden agree that compliance with a standard is mandated by law.

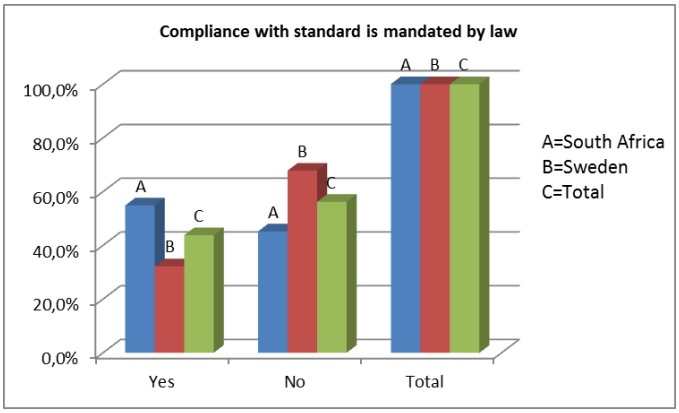

Fig. 4. Compliance with the standards mandated by law

About 45.2% of respondents from the QI of South Africa are not aware that law mandates compliance with the standard, whereas 67.8% of respondents from the QI of Sweden also are not aware that law mandates compliance with the standard. This implies that although respondents from both the QI South Africa and Sweden know that compliance with the standards is mandated by law, there are other respondents from the QI of both countries that are not aware that compliance with the standard is mandated by law.

Fig. 4. shows that South Africa and Sweden consider that standards can be used as technical regulations. This indicates that both countries recognize the significance of standards. Recognising standards, especially the international standards encourage trade among countries, considering the principle of one product one standard. This principle breaks barriers to trade between countries.

Fig. 5. shows that 75.4% of the respondents from the QI of South Africa do not agree that the certification mark of the National Certification Body provides regulatory recognition at National level whereas 100% of the respondents from the QI of Sweden also do not agree that the certification mark of the National Certification Body provide regulatory recognition at National level.

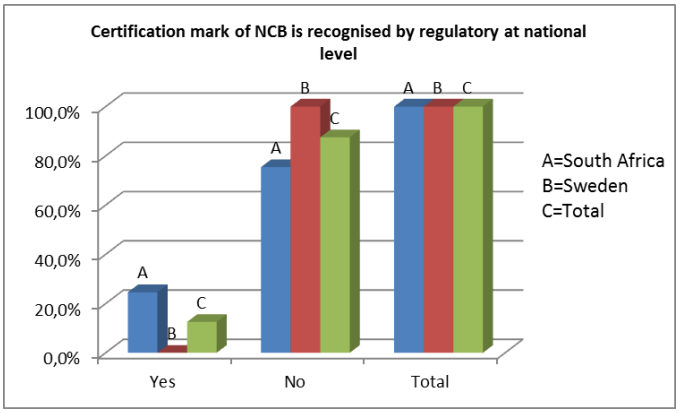

Fig. 5. National Certification Body (NCB) provides a regulatory recognition at National level

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Only 24.6% of respondents from the QI of South Africa agree that the certification mark of the National Certification Body provide regulatory recognition at National level whereas on the other hand none of respondents from QI of Sweden agree. This implies that majority of respondents from both South Africa and Sweden do not agree that certification mark of the National Certification Body provides a regulatory recognition at National level but only 24.6% of respondents from QI of South Africa agree that certification mark of the National Certification Body provides a regulatory recognition at National level.

Fig. 5. shows that South Africa and Sweden do not recognize the certification mark of their national certification body. It is recommended that these countries should recognise the certification mark at the national level since product that carry the certification mark is a proof that product meets the requirements of the standard. If the certification mark can be recognized at national level, there is an opportunity that this certification mark can be recognized globally.

Fig. 6. shows that 100% of the respondents from both the QI of South Africa and Sweden agree that their organisations play a role in reducing non-compliance in their respective countries. This implies that respondents from both countries recognize and acknowledge that their organisations play a role in reducing non-compliance in their country.

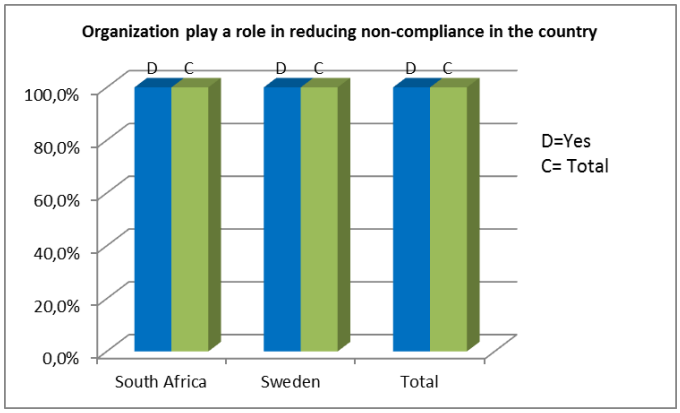

Fig. 6. Organisations role in reducing non-compliance in country

Fig. 6. shows that institutions that form part of the QI in South Africa and Sweden play a role in reducing non-compliance. This is why the QI is an important mechanism to protect the market of these countries. Since customs are point of entry for imported products for each country. Therefore it is recommended that institutions that form part of the QI should work together with customs to eradicate non-compliance at the ports of entry.

Fig. 7. shows that 100% of respondents from the QI of South Africa agree that their organizations play a role in adding value to the economy of their country, whereas 98.3% of respondents from the QI of Sweden also agree that their organizations play a role in adding value to the economy of their country. This implies that respondents from both the QI of South Africa and Sweden agree that their organizations play a role in adding value to the economy of their country.

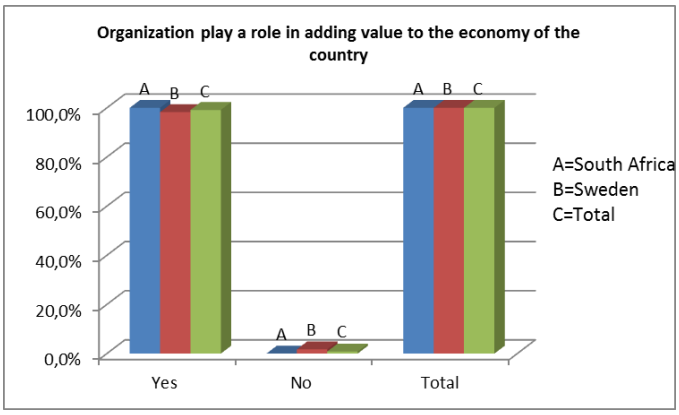

Fig. 7. Organisations role in adding value to the economy

Fig. 7. shows that institutions that form part of the QI play a vital role in adding value to the economies of South Africa and Sweden. This indicates that these institutions are important in promoting trade and its benefits which to help the economies of their countries.

VII. Conclusion

The study establishes the common similarity and differences between the two countries with respect to the quality infrastructure. More importantly, the study confirms that quality infrastructure helps to reduce inferior products in the market and positively impact the economy.

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